

Lawrence Livermore National Laboratory

Unique Facilities and Centers

One-of-a-kind experimental facilities, world-class computing resources and specialized centers of expertise at Lawrence Livermore National Laboratory (LLNL) enable researchers to achieve science and technology breakthroughs that strengthen the nation's security, well-being and prosperity.

Modern scientific research is built upon the triad of theory, experiment and simulation. In order to carry out its national security mission, LLNL has designed and constructed a host of one-of-a-kind experimental facilities and has collaborated with industry to develop and deploy successively more powerful and more capable supercomputers. These resources have been integrated to create a number of centers of excellence that provide unique capabilities of solving problems of scientific and national security importance. Some of LLNL's special facilities and centers are highlighted below.

National Ignition Facility (NIF). The 192-beam facility is the largest and most energetic laser system in the world. As the only facility capable of creating the conditions necessary for fusion ignition – the source that powers the sun and stars – in a laboratory setting, NIF is a critical experimental facility for stockpile stewardship. NIF also is an important international scientific resource for investigating the properties of materials at extreme conditions and the feasibility of fusion energy as a future power source.

Terascale Simulation Facility (TSF). The Laboratory is home to some of the world's fastest supercomputers, among them Sequoia and Vulcan. These machines can perform trillions of operations per second – in fact, a calculation that would take an entire day in 1995 now takes one second. The super machines explore a

broad range of science, from ensuring the safety and reliability of the nation's aging nuclear deterrent to complex simulations ranging from energy research, drug development and understanding of the human heart.

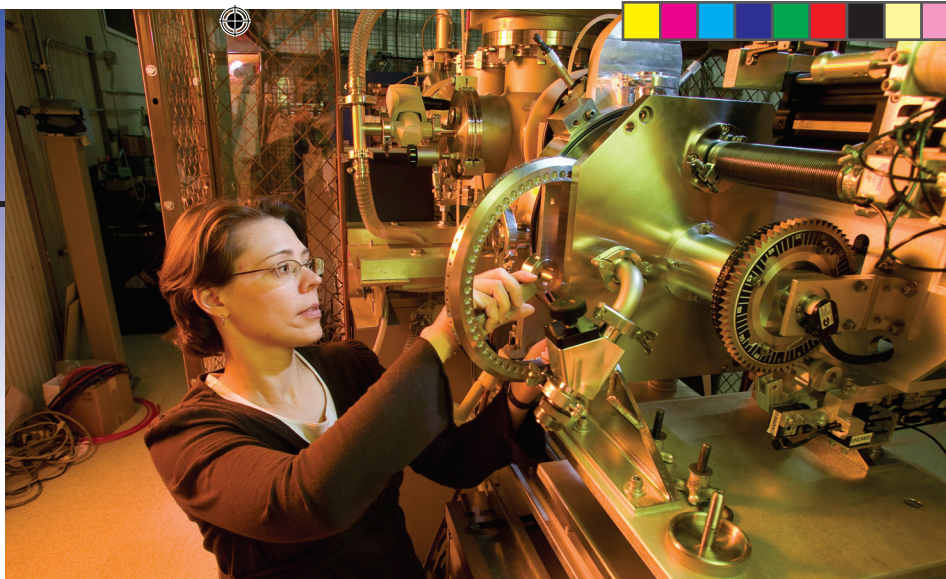
High Explosives Research. LLNL is a global leader in explosives testing. The Contained Firing Facility (CFF) is a modern hydrodynamic testing facility that conducts experiments using up to 60 kilograms of high explosives. Located at the Lab's nearby test facility known as Site 300, CFF provides full containment of all explosive debris for high-quality environmental management. Located at the Lab's main site, the High Explosives Application Facility (HEAF) is a state-of-the-art facility for the research and development, synthesis and formulation, and characterization and testing of explosives. HEAF has seven fully contained firing tanks for testing explosive quantities up to 10 kilograms and a specially designed firing tank for high-velocity studies.

National Atmospheric Release Advisory Center (NARAC). NARAC is a national resource for predicting the spread of hazardous materials released, accidentally or intentionally, into the atmosphere. NARAC provides plume predictions within minutes of a release for emergency managers to use in response to myriad disasters, from industrial fires in the wake of Hurricane Katrina, to the Chernobyl and Fukushima nuclear power plant releases to volcanic eruptions in the Philippines and Hawaii.

With its High Explosives Application Facility, the National Nuclear Security Administration named LLNL a Center of Excellence for high-explosives research and development.

Unique Facilities and Centers

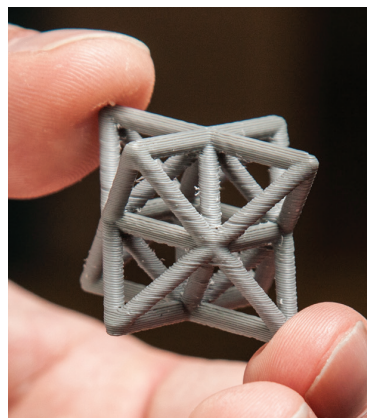
The Center for Accelerator Mass Spectrometry performs more than 25,000 measurements per year, identifying isotopic compositions and relative abundances for research in archaeology, climatology, forensic dating and many other fields.



Forensic Science Center (FSC). The FSC offers unmatched capabilities for analyzing ultra-trace levels of virtually any compound in any sample matrix. Expertise and instrumentation are available for complete chemical and isotopic analysis of nuclear, inorganic, organic, and biological materials. The FSC also develops new techniques and instruments for forensic analysis in the laboratory and the field.

Center for Accelerator Mass Spectrometry (CAMS). CAMS is the world's most versatile and productive accelerator mass spectrometry facility. With its ability to measure the isotopic compositions of extremely small samples and determine relative isotopic abundances at exceedingly low levels, CAMS is used for research ranging from paleo-climatology and carbon-cycle dynamics to DNA repair and drug metabolism. CAMS recently provided assistance to law enforcement agencies through the development of a method to more accurately identify the dates of birth and death of bodies involved in cold cases.

Center for Micro and Nano-Technologies (CMNT). The center has been a leader in fueling the commercial growth of micro- and nano-technologies while simultaneously customizing these same technologies for unique, noncommercial applications specific to the Laboratory and Department of Energy. CMNT scientists and engineers focus on device development, system integration, platform technology to develop highly integrated bio-microsystems (for sensors and medical devices), photonic microsystems (for high-speed signal and data acquisition), micro-electromechanical systems (for advanced sensing and actuation) and scalable power systems. The center was instrumental in the development of an artificial retina, which has been approved by the FDA.



Three-dimensional structures that could take weeks or months to machine now can be done in a matter days or even hours through additive manufacturing.

Additive Manufacturing. Often referred to as 3D printing, additive manufacturing (AM) involves creating three-dimensional structures using a machine that sequentially deposits one material on top of another, layer by layer, until the desired shape is complete. AM technologies will help the Laboratory achieve its missions with the Department of Energy, departments of Defense and Homeland Security, as well as in development of its energy applications. The Laboratory also has extensive plans to collaborate with U.S. manufacturers to help them become more competitive in the global marketplace.

Livermore Valley Open Campus (LVOC). In partnership with neighboring Sandia National Laboratories/California, the Laboratory has created LVOC, an open, unclassified research and development center to stimulate major economic growth through industrial and academic collaborations.

For more information, contact the LLNL Public Affairs Office, P.O. Box 808, Mail Stop L-3, Livermore, California 94551 (925-422-4599) or visit our website at www.llnl.gov.

LLNL is managed by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy, National Nuclear Security Administration, under Contract DE-AC52-07NA27344.

LLNL-BR-423449



Lawrence Livermore National Laboratory